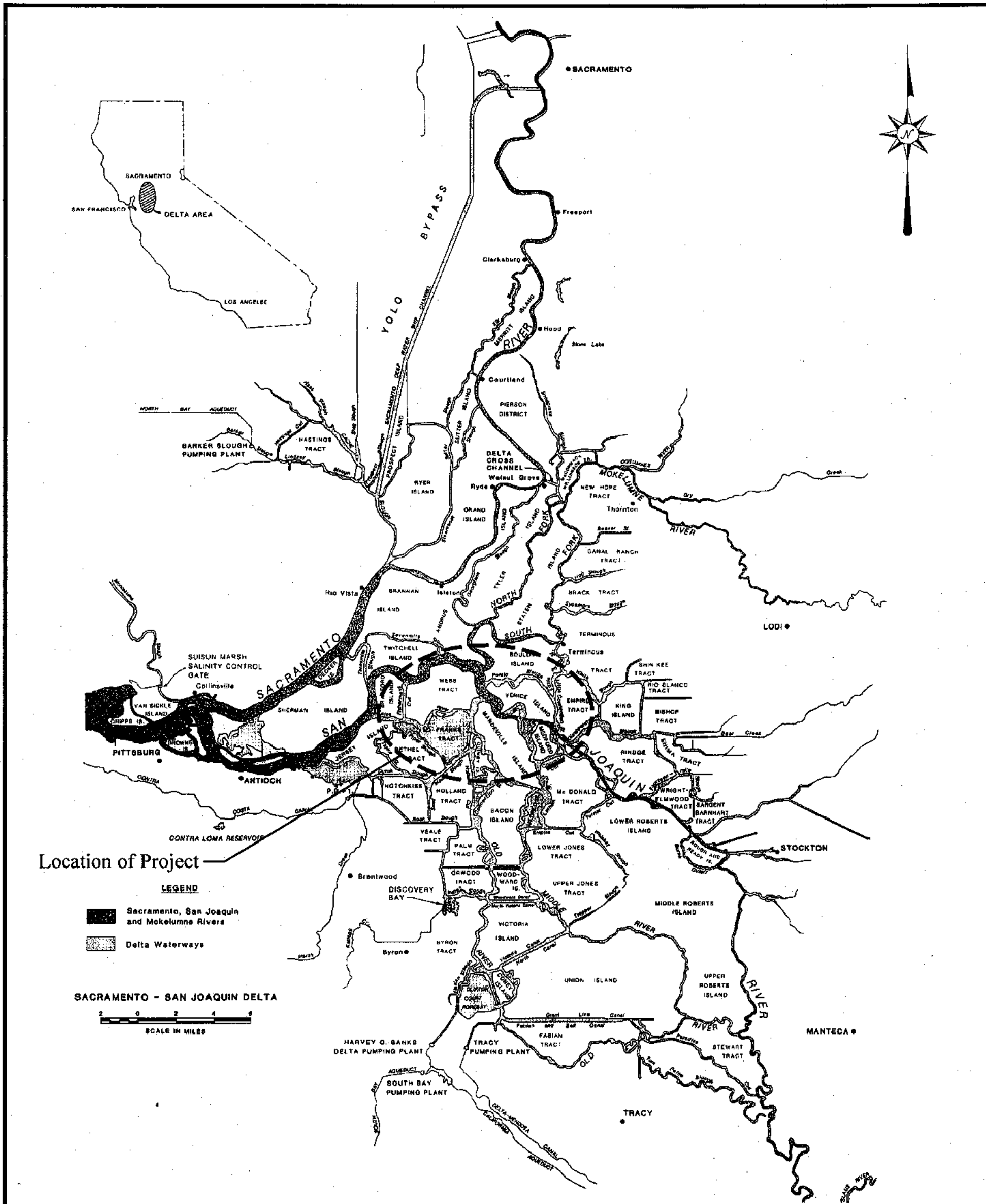
Figure 1. Regional Project Location Map



Location Map

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Demonstration Project for the Protection and Enhancement of Delta In-Channel Islands

Project Sites

Figure 2. Close-Frame Project Location Map

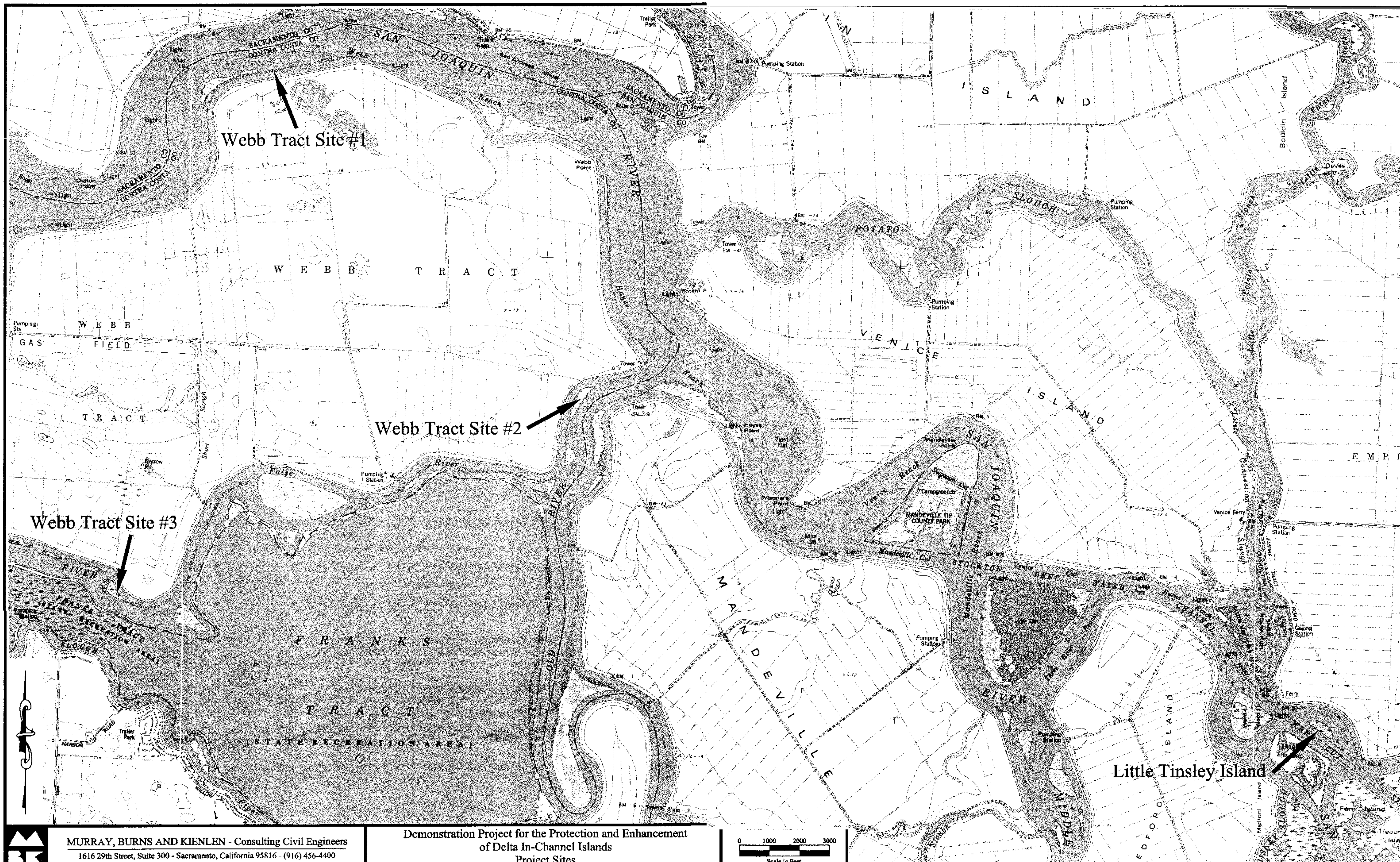
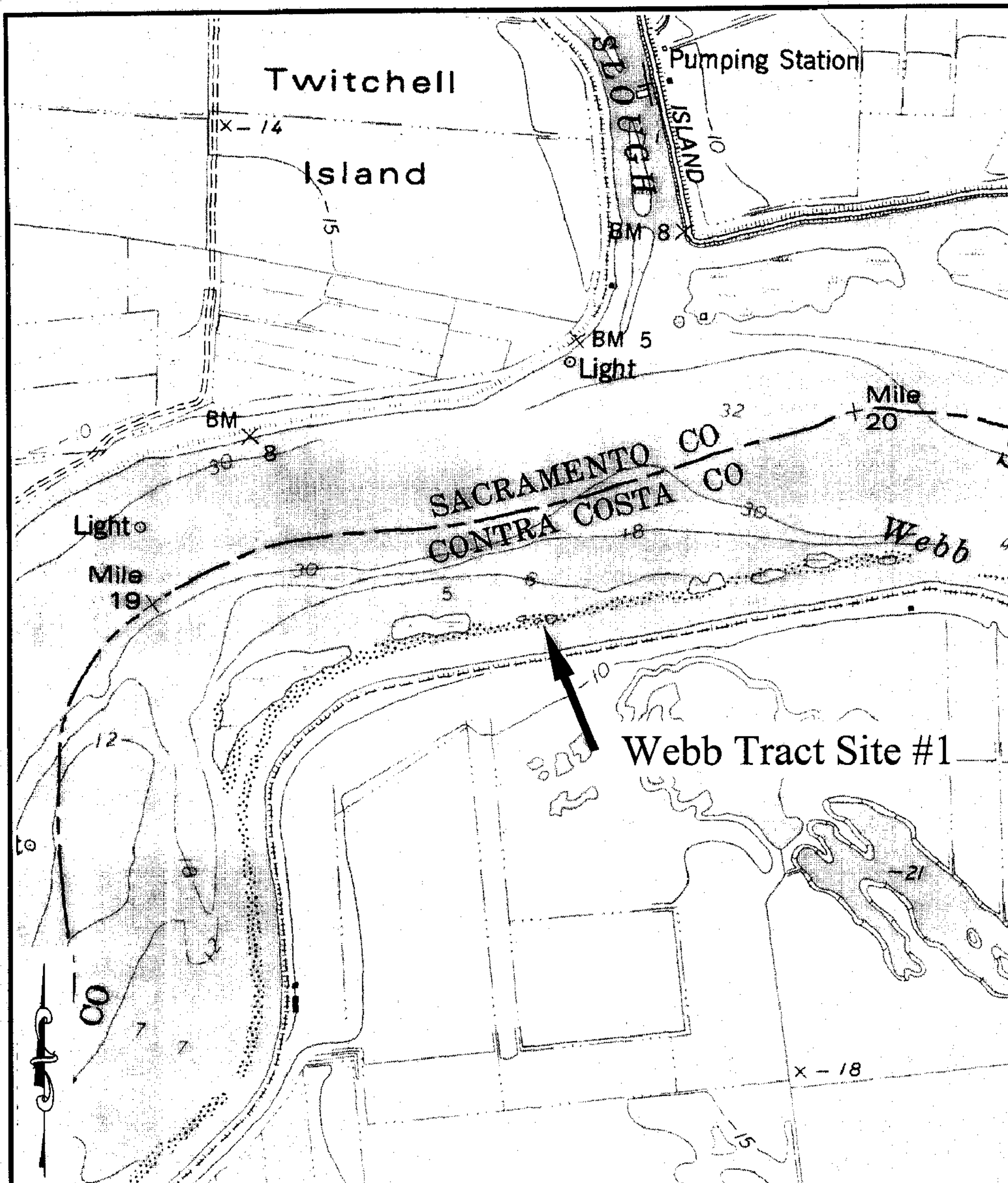
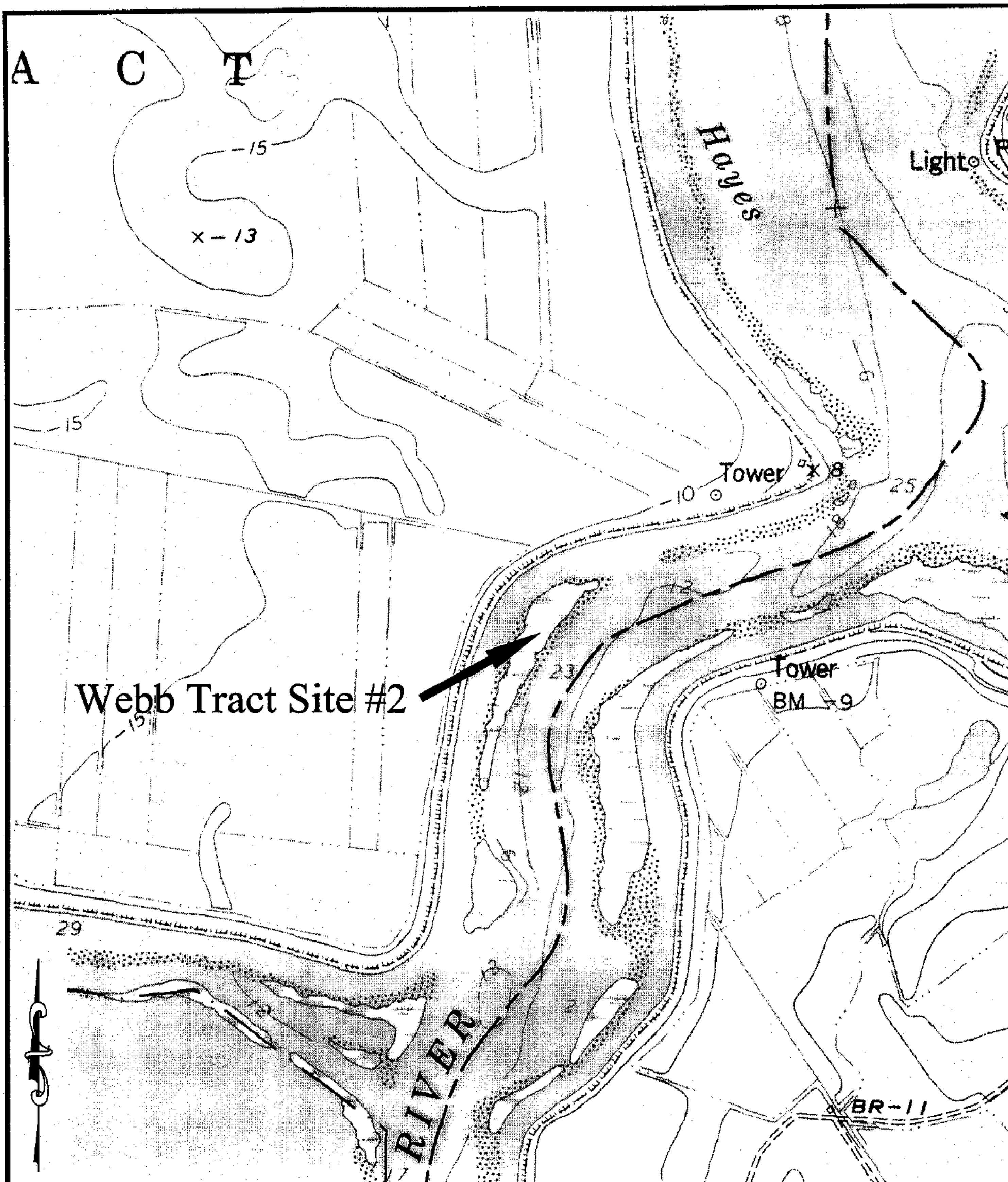


Figure 3. Webb Tract Site #1



MURRAY, BURNS AND KIENLEN Consulting Civil Engineers 1616 29th Street, Suite 300 Sacramento, California 95816 (916) 456-4400	Demonstration Project for the Protection and Enhancement of Delta In-Channel Islands Webb Tract Site #1	0 250 500 750 1000 Scale in Feet

Figure 4. Webb Tract Site #2



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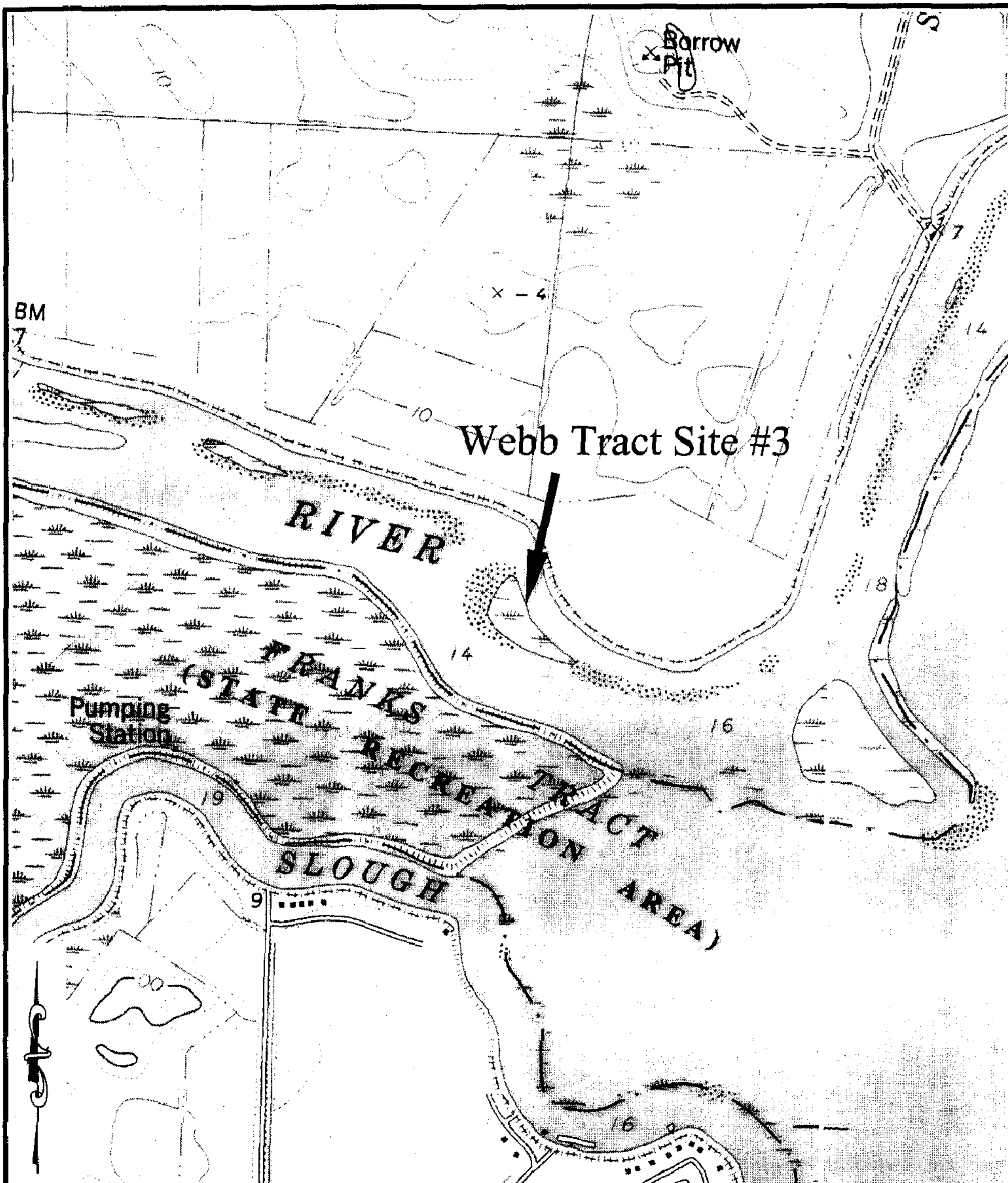
of Delta In-Channel Islands
Webb Tract Site #2

0 250 500 750 1000
Scale in Feet

Figure 5. Webb Tract Site #3



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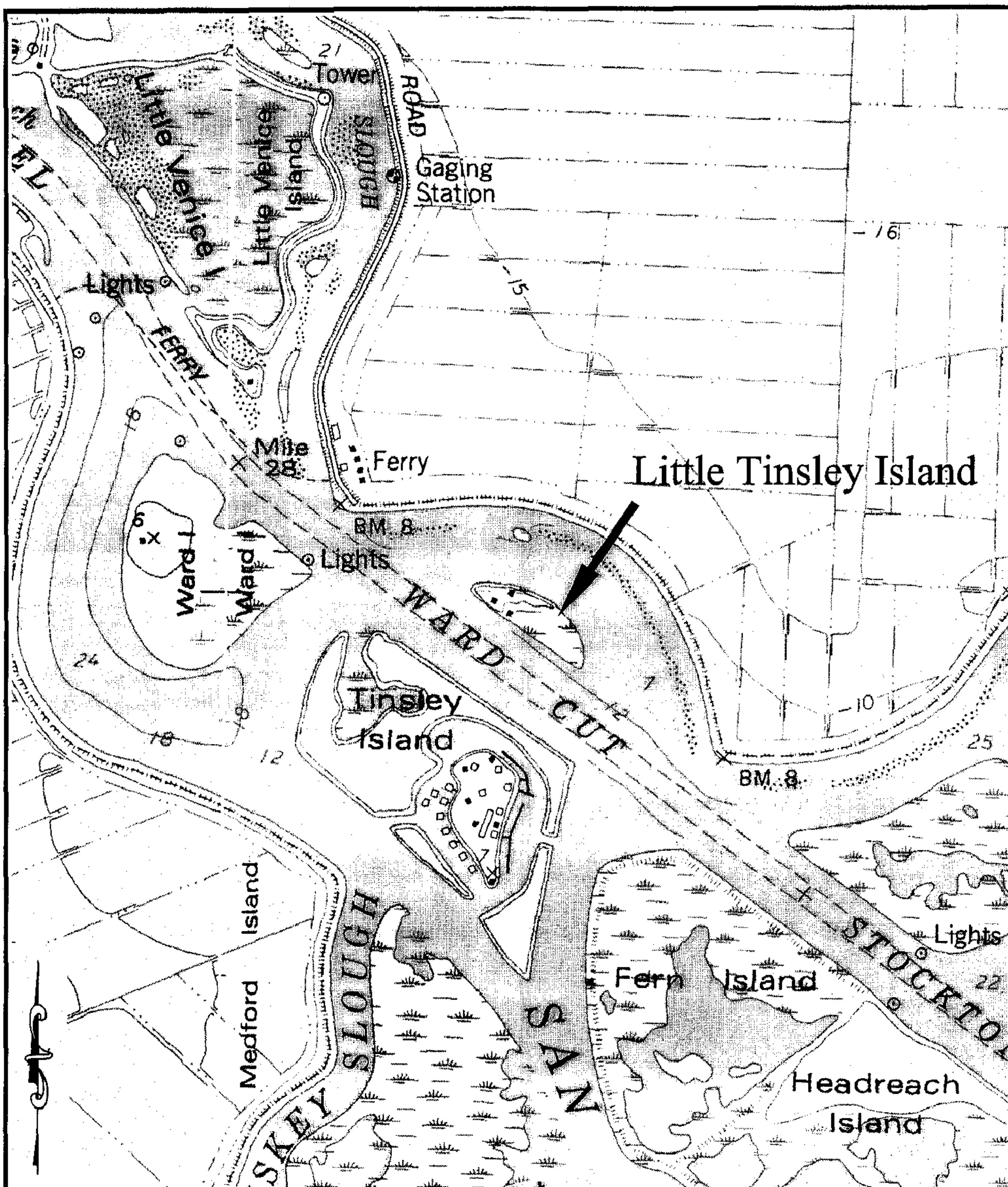
Demonstration Project for the Protection and Enhancement of Delta In-Channel Islands
Webb Tract Site #3

0 250 500 750 1000
Scale in Feet

Figure 6. Little Tinsley Island



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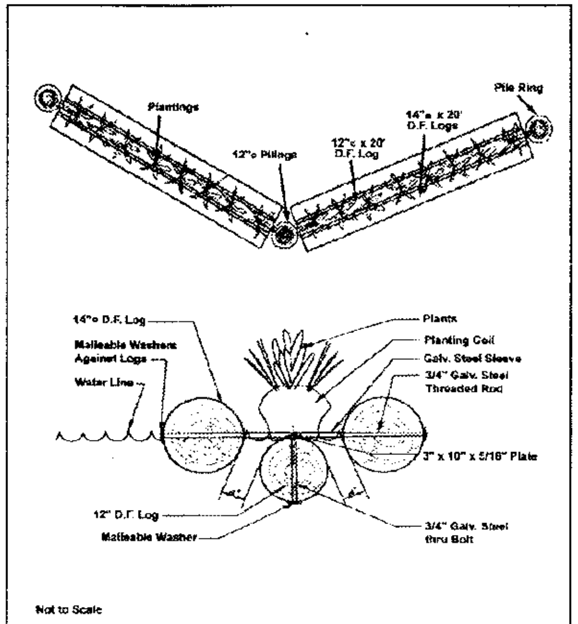
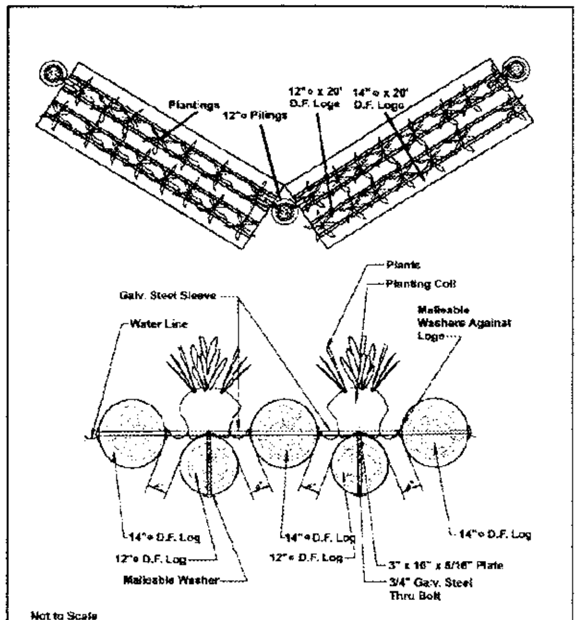
Demonstration Project for the Protection and Enhancement
of Delta In-Channel Islands
Little Tinsley Island

0 250 500 750 1000
Scale in Feet

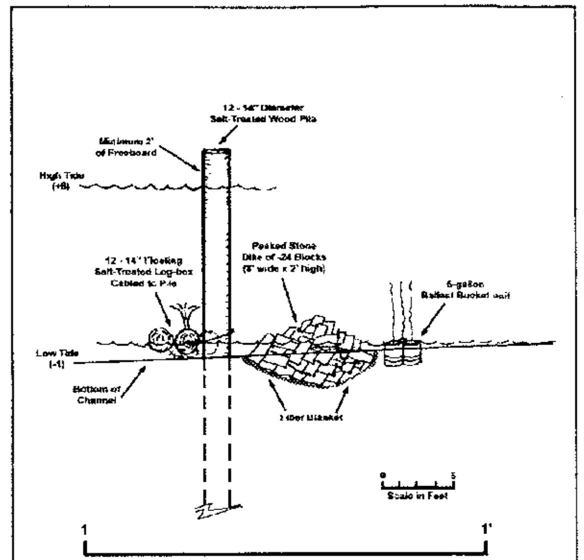
Figure 7. Biotechnical Methods: Cross-Sections



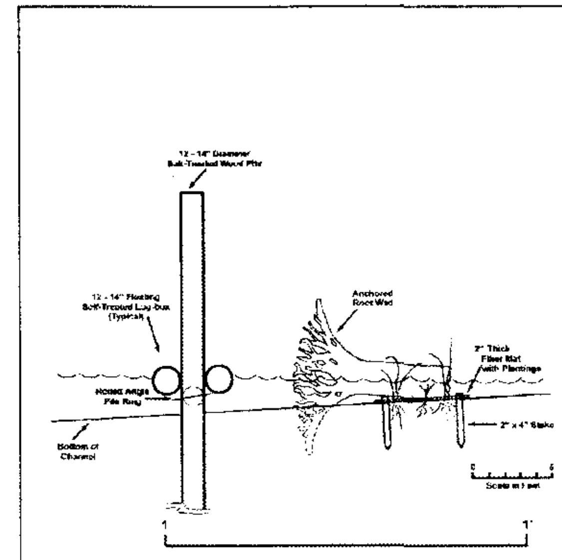
3-Log Floating Vegetated Breakwater and Pilings
Construction Detail (Typical)



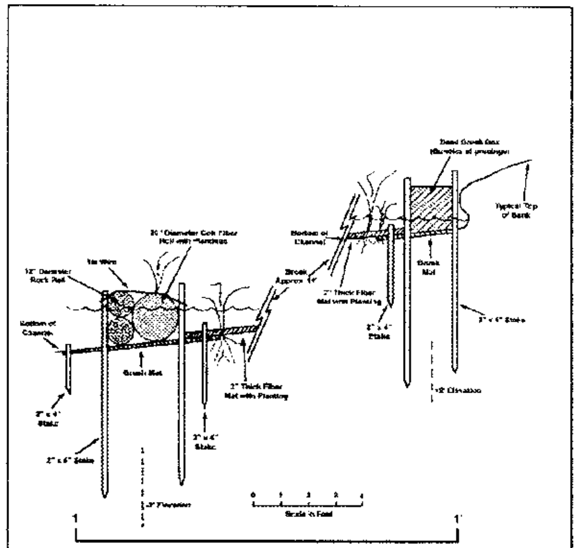
5-Log Floating Vegetated Breakwater and Pilings
Construction Detail (Typical)



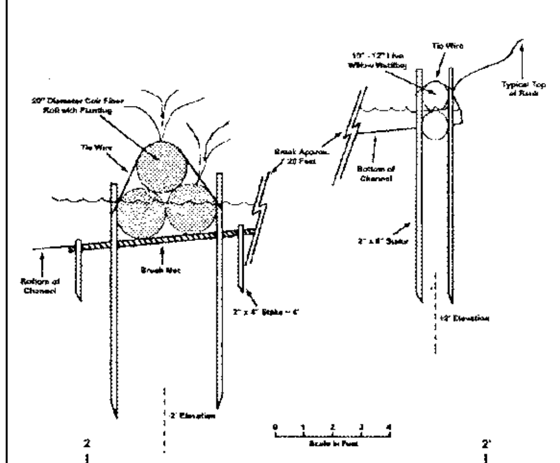
Webb Tract 1: Section 1



Webb Tract 2: Section 1



Little Tinsley: Section 1



Little Tinsley: Section 2

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EIP ASSOCIATES

Source: Kjeldsen, Sinnock, and Neudeck, Bathymetry, February 1999; Murray, Burns, and Kienlen, March 1999; and EIP Associates, Biotechnical Design and GIS Program, April 13, 1999.

with Andrew T. Leiser, PhD.

Project Number: 10224-00
Requested By: RN/DE
Revision: April 13, 1999.
Drawn by: MGH
Approved by:
Notes:

DEMONSTRATION PROJECT FOR THE PROTECTION AND ENHANCEMENT OF DELTA IN-CHANNEL ISLANDS

DETAILS

CROSS SECTION: BIOTECHNICAL METHODS
WEBB TRACT SITES & LITTLE TINSELY ISLAND

SHEET 5 of 5 SHEETS

Table 1: Bioengineering methodology for the various treatments under consideration for the proposed Delta In-channel Island Habitat Restoration Project.

General Type	Sub-Type	Construction Techniques
Pilings		The vertical members are to be 12 to 14 inches in diameter salt-treated wood pilings sunk into the substrate to a depth sufficient for anchoring log-booms and boxes. There should be enough freeboard remaining to keep the booms and boxes from coming free of the piling during combined peak storm and tide events.
Breakwaters	Floating Vegetated Breakwaters	These units come in two separate widths: 3 and 5 log. They are constructed in the same manner and from the same materials (20 feet long and 12 to 14 inches in diameter salt-treated wood pilings). A 3-log unit is constructed by placing two 14-inch-diameter logs parallel to each other and a 12-inch-diameter log is placed below them to form a V-shape. Care is taken to ensure that a 4-inch gap is left between the upper and lower logs. The entire assembly is then bolted together with threaded rods placed on 5-foot centers. In the space between the two upper logs a custom-built planted fiber roll is installed and anchored in place. The entire unit is attached to the vertical piling with a rolled angle pile ring that allows the log-boxes to rise and fall with the tide changes. A 5-log unit (or a double box) is constructed in a similar manner as discussed above except that three 14-inch- and two 12-inch-diameter logs are used to create a W-shape on which two rolls of fiber and plants are installed.
	Peak stone dike	The peak stone dike is to be constructed from -24 stone (rocks approximately 24 inches by 12 inches by 12 inches). To achieve a proper slope of 1:2 and a 2-foot final vertical elevation, the base of the dike must be 8 feet wide. A fiber mat may be placed below the peak stone dike or a gabion type structure may be used to keep the stone from sinking too far into the substrate. The peak stone dike is to be constructed at approximately the minus 3-to 4-foot contour so that the peak of the dike just breaks the surface at mean low tide.
	Rock groin	The rock groin construction details are still under design.
	Root Wads	Root wads will be obtained from a local source (fruit or nut orchard) and are expected to be several feet in diameter with a segment of trunk remaining. The exact dimensions will vary and depend on the source. All root wads are to be placed so that the trunks are pointed towards the island. It will be necessary to place pilings periodically that will allow the root wads to be cabled together and anchored in place. As specified in the various drawings there are to be gaps in the row of root wads. At these locations, the ends of the two rows should overlap.

General Type	Sub-Type	Construction Techniques
Breakwaters (continued)	Rock and fiber rolls	At either side of the proper contour level, two rows of stakes, 31 inches apart, are driven into the substrate on 2-foot centers to a depth of 6 feet and let sit for 30 minutes before installing rolls. Stakes made from 8-foot-long 2-by 6-inch lumber with a point and barbs cut at one end. These stakes also hold in place two 3-foot by 16-foot brush mattress, set side by side, that extend approximately 2 feet in front of the roll assembly to prevent undercutting. One of the treatments involves stacking two rock rolls and a fiber roll to form a pyramid. Installation would involve placing a rock roll between the rows of stakes as far from the island as possible. The fiber roll would be placed on the island side of this rock roll. The second level would be another rock roll placed on top of the rock and fiber rolls. The entire assembly is then wired to the stakes and the fiber roll is planted. The other treatment involving rolls, does not use any rock rolls. This is a stack of three 20-inch-diameter fiber rolls. Essentially installation is the same as discussed above with the minor difference that the two rows of stakes need to be 40 inches apart. The brush mats to be used are manufactured by Bestmann Green Systems under the name BestLift Brush-Mat™. They come in a single standard size: 3 feet wide by 16 feet long by 0.8 inches thick. The rock rolls to be used are manufactured by Bestmann Green Systems under the name BesTec Rock-Roll™. The size required for this project are 12 inches in diameter and come in 6-foot lengths. Due to the weight of the full roll, over 110 pounds per linear foot, power equipment is required for installation. The fiber rolls to be used are manufactured by Bestmann Green Systems under the name ArmaFlor Fiber-Roll™. The size required for this project are 20 inches in diameter and come in 10-foot lengths.
Breakwaters (continued)	Brush boxes	The brush used to create the brush boxes is to be obtained from a local source such as orchard prunings. The brush can be wired into small bundles (4 to 6 inches in diameter) off site. The brush bundles are placed between parallel rows of stakes and wired in place. Stakes made from 8-foot-long 2-by 6-inch lumber with a point and barbs cut at one end. At the proper contour level (minus 2 feet), two rows of stakes, 18 inches apart, are driven into the substrate on 2-foot centers to a depth of 6 feet and let sit for 30 minutes before installing the pre-bundled brush. These stakes also hold in place a 3-foot by 16-foot brush mattress that extend approximately 2 feet in front of the brush box to prevent undercutting. The bundles are then packed as densely as possible between the stakes to achieve the desired total height of approximately 2 feet. Once the desired elevation is reached, wire is used to tie the bundles in place. This is done by running wire between the stakes directly across from each other and to those on diagonal. Bundles should be placed so they overlap and no vertical seams are created.
Plantings	Small ballast buckets	These are a biodegradable fiber pot that is 6 inches in diameter by 16 inches tall and partially filled with scoria, soil, and plant material. Sometime prior to installation these are planted with the appropriate species for their destination. These small buckets are intended to be placed within the rock groins if possible where the stones will hold them in place. They will also be placed behind or within the nearshore brush boxes on Little Tinsley.

General Type	Sub-Type	Construction Techniques
Plantings (continued)	Large ballast buckets	The large ballast buckets are made from three 5-gallon biodegradable fiber pots wired together. They are filled and planted in a manner similar to the 6-inch pots (scoria, soil, and plant material) and planted prior to installation. These units are to be staked into the substrate with a single center stake to a depth of approximately half their height.
	Fiber mats	The fiber mats to be used are manufactured by Bestmann Green Systems under the name ArmaFlor Fiber Mat™. The factory cut dimensions are 16 feet by 3 feet by 2 inches but they can be cut on-site to the required size. These mats are to be located as specified in the site treatment on the island side of the breakwaters (peak stone dike or root wad wall). Stakes (4-foot 2-by 4-inch lumber with a point and barbs cut at one end) are to be driven through the mat and into the substrate as far as possible and let sit for 30 minutes before installing plants on the mat. It may be necessary to tie the mat between stakes with wire or other suitable material. In some instances the mats may be attached to nearby root wads. Regardless of how they are fixed to the ground, the mats will then be planted with the appropriate vegetation.
	Live willow wattling	Live willow cuttings are to be assembled into bundles for installation. These bundles are generally 1 to 2 feet longer than the longest cutting. They are tied in 10-to 12-inch diameter bundle every 12 to 15 inches on center. A row of stakes (8-foot 2-by 6-inch lumber with a point and barbs cut at one end) is installed every 2 feet on center. The first wattling bundle is then placed into a shallow trench (or pushed into the substrate) that is approximately 4 to 6 inches deep and covered with soil. The second bundle is placed on top of the first and wired to the stakes.

Table 2. Specific Tasks, Deliverables and Phases

Task I. Construction

Subtask A. Administrative/Technical Support for Work Group

Work group members and the Project Coordinator will develop and distribute meeting agendas, materials, summaries; assist with writing quarterly reports, final reports, and decision memoranda; preparation of draft and final contracts; prepare final design and construction specifications; assist with preparation of presentations to CALFED and other appropriate audiences on the progress of the demonstration project; and provide oversight of construction contractors, facilitate concerns between work group and contractors. Engineering consultants will provide oversight of construction sites.

Schedule:

Meeting organization and distribution of materials (at least 6 meetings annually)	July 1999 - Jan. 2001
Completion of contracts and subcontracts, submitted for review to CALFED	July 1999 - June 2000
Prepare final design and construction specifications	July - September 1999
Preparation of quarterly/final reports	Oct. 1999; January, April, July, Oct. 2000; Feb 2001
Presentations to CALFED and others	July 1999 - June 2003
Construction and Project oversight	July 1999 - July 2001
Accounting and Technical Support	July 1999 - Jan. 2003

Deliverables: Meetings, meeting materials and summaries; monthly accounting reports, draft and final contracts, draft and final subcontracts, final designs and specifications, quarterly and final reports; presentations to CALFED and others as requested.

Subtask B. Little Tinsley Island

This larger in-channel island is currently experiencing erosion primarily due to boat wakes and wind wave forces, although tidal current erosion and weathering of the peat soils are also contributing to bank losses. The demonstration project proposes to use and evaluate several bioengineering alternative techniques such as floating breakwaters and woody plant material along a 600 linear foot shoreline. These techniques will be designed to arrest erosion, protect existing habitat values, and create new habitat areas. Because of its size and other features, Little Tinsley will allow for side-by-side comparisons of a number of techniques, including riprap (that has already been installed by the owner, independent of this demonstration project).

Schedule: Install bioengineering techniques — August - November 1999

Deliverables: Installation of demonstration projects, plans, photos.

Subtask C. Webb Tract Site 1

This submerged shoal is extremely vulnerable to erosion by flows in the Stockton Deep Water Ship Channel and the dredged channel adjacent to Webb Tract. Methods being explored for this island includes floating breakwaters, plant materials, a peaked stone dike behind the floating breakwater and other units to promote growth of vegetation and fish foraging habitat.

Schedule: Install bioengineering techniques — August 1 - Nov. 30, 1999

Deliverables: Installation of demonstration projects, plans, photos.

Subtask D. Webb Tract Site 2

This emergent shoal is also subject to erosion from water flows in Old River and boat wakes. Outboard protection will be floating breakwaters of planted log-boxes that will be grouped to allow a sid-by-side comparison of effectiveness. Anchored root wads behind the floating breakwater will disrupt the sub-surface wave energy. Coconut fiber mattresses and planting will aid the growth of aquatic vegetation.

Schedule: Install bioengineering techniques — August 1 - Nov. 30, 1999

Deliverables: Installation of demonstration projects, plans, photos.

Subtask E. Webb Tract Site 3

This peat island is subjected to water flows from False River and wind generated waves from Franks Tract. A combination of stone groins, root wads, ballast buckets, planted log-boxes will be installed to counteract the wind and boat generated waves.

Schedule: Install bioengineering techniques — August 1 - Nov. 30, 1999

Deliverables: Installation of demonstration projects, plans, photos.

Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing, Supplies	Cost
Task I. Construction		$140,000	$60,270	$2,438,400			
Task I. Subtotal	2550						$2,638,670

Task II. Monitoring

Subtask A. Little Tinsley and Webb Tract Islands Monitoring

The three-year adaptive monitoring plan will emphasize habitat monitoring, but will be carried out per the permitting and CMARP requirements. Monitoring elements will include 1) physical/ technological evaluations of the different stabilizing methods and biological assessments of vegetation, fauna and special status species. The monitoring of the installed projects will evaluate effectiveness of methods used, cost comparisons, ease of implementation, suitability, benefits to species and habitat (physical and biological monitoring). Monitoring reports will be submitted for three years.

Schedule: Monitor projects — July 1, 1999 - Dec. 10, 2004
Compile and analyze monitoring data — July 1, 1999 - Dec. 10, 2004
Submit reports to CMARP, IEP, etc. — Annually

Deliverables: Annual data/monitoring reports for three years.

Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing Supplies	Cost
Task II. Monitoring				$250,000			
Task I. Subtotal							$250,000

Task III. Maintenance

Subtask A.Maintenance/Contingency Fund - Four Islands

Installed projects on all islands will be maintained in good, working order for three years. A contingency fund of ten percent is needed for unanticipated costs due to delays and needed maintenance materials.

Schedule: Maintain all biotechnical installations Dec. 1999 - Dec. 2003

Deliverables: Document maintenance, report.

Subtask B. Maintenance of Demonstration Projects on all Islands

Maintenance monitoring will be performed on a regular basis, reports compiled and submitted for work group review.

Schedule: Make site visits and schedule appropriate maintenance Dec. 1999 - Dec. 2004

Deliverables: Well maintained projects.

Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing Supplies	Cost
Task III. Maintenance				$250,000			
Task I. Subtotal							$250,000

Table 3. Monitoring Plan

Objective 1: To demonstrate that the erosion of the Delta's in-channel islands can be slowed, stopped or reversed using appropriately engineered biotechnical methods.

Hypothesis	Monitoring Parameter	Data Evaluation
1A: Hydrodynamic energy can be dissipated by installing appropriate biotechnical methods along shorelines.	Empirical observations and water current measurements.	Visual and photographic documentation of wave or current dissipation on treated and untreated areas. Pre- and post- project current measurements & evaluation of impact on surrounding areas.
1B: In-channel island substrate can be conserved and/or accreted using biotechnical methods.	Field mapping	Changes in elevation will be compared with adjacent untreated sties. ANOVA analysis to determine significance.
1C: Biotechnical methods offer stable, longterm protection against erosion.	Empirical observation	Visual documentation from fixed photopoints comparing treated and untreated areas over time.
1D: Site specific hydro-dynamic conditions will dictate biotechnical treatment prescriptions.	Evaluate performance of alternative biotechnical methods in similar hydrodynamic environments.	ANOVA evaluation of differences in vegetative cover and elevation in adjacent alternative treatments.
1E: Site specific biotechnical design criteria will prevent erosion and facilitate accretion.	Comparison of sediment loss or accretion, wave attenuation, affect on current regime, rate and amount of vegetation colonization.	Pre- and post- mapping, current measurements and vegetation analysis.
1F: Site specific plantings as a part of a biotechnical design and structure will enhance habitat and sediment retention.	Comparison of sediment accretion or loss.	Pre- and post- measurements of sediment regime.

Objective 2: To demonstrate that biotechnical erosion control methods can be successfully installed with positive effects on important/priority fish and wildlife.

Hypothesis	Monitoring Parameter	Data Evaluation
2A: Biotechnical erosion control methods, and the habitat they protect, will benefit priority fish species.	Pre and post-project fisheries monitoring will be performed using appropriate methods approved by regulatory agencies.	Seasonal census of priority fish populations associated: 1) around the project islands and 2) within the biotechnical structures and vegetation.
2B: Biotechnical methods will protect and possibly benefit terrestrial biota.	Pre and post-project monitoring of selected terrestrial biota using appropriate methods.	Differences in percentages of native vegetative cover. ANOVA to determine significance.
2C: Vegetation establishment along island edges will be enhanced by biotechnical erosion control methods.	Vegetation succession: Riverine emergent, riverine aquatic bed, shaded riverine aquatic habitat quantification and qualification.	Pre- and post- project analyses of vegetation populations.
2D: Non-native invasive plant or animal species will not benefit from the biotechnical erosion control methods.	Pre and post-project monitoring of non-native invasive species.	Change in non-native plant or animal species composition.

Table 4. Costs

Task I. Construction
Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing Supplies	Cost
Task I. Construction							
Subtask A. Admin/Tech	2550	$140,000	$60,270				$200,270
Project Coord.				$100,000			$100,000
Project Const. Management				$94,000			$94,000
Final Design/Specs				$30,000			$30,000
Design Inspection				$40,000			$40,000
Const. Inspection				$64,200			$64,200
Subtask B. Little Tinsley				$270,000			$270,000
Subtask C. Webb Tract 1				$150,000			$150,000
Subtask D. Webb Tract 2				$1,350,000			$1,350,000
Subtask E. Webb Tract 3				$340,000			$340,000
Task I. Subtotal	2550	$140,000	$60,270	$2,438,400			$2,638,670

Estimated Work Group Share Task I - Support provided by work group members for technical review/advice attendance at least 12 meetings by 12 members ($60/hr X 576 hrs = $34,560); Administrative in-kind @$1000 X 18 mo by SF Bay RWQCB plus postage ($19,000); ABAG in-kind accnt/manag support ($16,258). **Total $70,000.**

Task II. Monitoring
Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing Supplies	Cost
Task II. Monitoring							
Subtask A. Monitoring 4 Islands(for 3 years)				$250,000			
Task II. Subtotal							$250,000

Estimated Work Group Share Task II - Support provided by work group members for technical review/ advice.
Total $2,500.

Task III. Maintenance
Estimated Budget:

Project Phase & Travel Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General Admin & Fee)	Service Contracts	Materials & Acquisition	Misc. Travel, Printing Supplies	Cost
Task III. Maintenance							
Subtask A. Maintenance /Contingency Fund				$214,000 (10% of construction costs)			$214,000
Subtask B. Maintenance Monitoring				$36,000			$36,000
Task III. Subtotal				$250,000			$250,000

Estimated Work Group Share Task III - Support provided by work group members for technical review/ advice.
Total $2,500

Total Work Group Share $ 195,000

Total amount requested from CALFED $ 3, 138,670

Table 5. ABAG Indirect Costs

Association of Bay Area Governments
Proposed Indirect Cost Plan for FY 99-00

		General		Information System Support		Combined	
Personnel Costs	Rate	Hours	Amount	Hours	Amount	Hours	Amount
Adsit, C.	25.48	1,000	25,480			1,000	25,480
Bursztynsky, T.	66.76			600	40,057	600	40,057
Chan, J.	71.31	900	64,177			900	64,177
Edgerton, P.	36.03	1,700	61,256			1,700	61,256
Eeds, D.	53.20	1,300	69,159			1,300	69,159
Ishikata, M.	22.05	950	20,945			950	20,945
Jones, P.	65.49	400	26,195			400	26,195
Kendrick, S.	30.80			200	6,160	200	6,160
Lewis, K.	31.25	1,300	40,620			1,300	40,620
Loss, M.	52.69	1,100	57,954			1,100	57,954
Mar, B.	28.09	1,000	28,087			1,000	28,087
McDaniels, M.	25.77			400	10,308	400	10,308
Samar, B.	36.76			1,600	58,812	1,600	58,812
Sheng, S.	44.71	1,000	44,710	500	22,355	1,500	67,065
Sullivan, A.	38.91	300	11,674			300	11,674
Tse, B.	27.87	1,100	30,660			1,100	30,660
Williams, A.	47.48	400	18,990	1,300	61,718	1,700	80,708
Clerical	27.00	1,000	27,000	50	1,350	1,050	28,350
Intern	10.00			300	3,000	300	3,000
Total Personnel		13,450	526,906	4,950	203,761	18,400	730,667
Other Direct Expenses							
Consultants--Systems			28,000				28,000
Travel			1,000				1,000
Temporary Personnel			4,000				4,000
Printing--outside			6,000				6,000
Conferences & Meetings			2,000				2,000
Equpment Maintennance			30,000				30,000
Office Supplies			55,000		32,000		87,000
Subscriptions & Memberships			1,700				1,700
Computer Processing			3,500				3,500
Depre.--Furniture & Auto			70,000				70,000
Depre--Computers			0		147,000		147,000
Depre.--Office Building			134,000				134,000
Audit Fees			30,000				30,000
Building Maintennance			174,000				174,000
Utilities			45,000				45,000
Space Rentals			6,000				6,000
Automobile Expense			8,000				8,000
Mailing			48,000				48,000
Telephone			50,000				50,000
Public Information			2,000				2,000
Insurance			65,000				65,000
Recruiting			5,000				5,000
Labor Relations			6,000				6,000
Staff Training & Development			15,000				15,000
Software Development			50,000				50,000
Carry-over From Prior Year			121,189				121,189
Miscellaneous			1,500		1,000		2,500
Total Other Direct			961,889		180,000		1,141,889
Rental Income			0				0
Mailing Label Chares					25,000		25,000
Copying Charges					22,000		22,000
Total Overhead			1,488,795		336,761		1,825,556
Direct Labor Cost			4,287,596		4,287,596		4,287,596
Indirect Cost Rate			34.72%		7.85%		42.58%

Table 6. MBK Project Team – Qualifications

GILBERT COSIO, JR. **Murray, Burns & Kienlen**	Mr. Cosio is a principal engineer and vice president of Murray, Burns & Kienlen. He is a registered professional engineer (civil). He began his 18-year career at Bechtel Power Corporation as a civil/structural design engineer in charge of concrete and steel design, and has been an employee of Murray, Burns & Kienlen since 1984 at which time he began working in the Delta. Mr. Cosio has experience in flood control, hydrology, hydraulics, water resource planning, drainage water supply, surveying and levee maintenance. Mr. Cosio is currently principal-in-charge of all Delta levee reclamation district work for Murray, Burns & Kienlen. Mr. Cosio coordinates levee inspections, levee maintenance and rehabilitation projects, competitive bid plans and specification preparation, and contract administration for Delta reclamation districts. He also oversees maintenance planning, funding application and claims, regulatory coordination, environmental assessments, CEQA documentation, and reports and presentation s to respective reclamation district boards of trustees. Mr. Cosio's Delta work has also led to testimony at public hearings, Reclamation Board hearings and workshops, and State Water Resources Control Board hearings. Mr. Cosio has coordinated levee work and claims with county, state and federal agencies in charge of disaster assistance. Mr. Cosio is a member of the Delta Coalition, which is a committee involved with developing legislation of importance to the Delta. Mr. Cosio is also a member of the Delta Levees and Habitat Advisory Committee set up to administer the mitigation element of the Delta Levee Subventions.
KENNETH L. KJELDSEN **Kjeldsen, Sinnock & Neudeck**	Mr. Kjeldsen has over 30 years experience in the field of civil engineering with emphasis in the planning, design and construction of municipal, public works and water resource related projects. As a principal in the firm of Kjeldsen, Sinnock & Neudeck, Inc., Mr. Kjeldsen is responsible for managing the projects undertaken by the firm, coordinating with the client and consultants, and reviewing all technical calculations and design decisions. Mr. Kjeldsen's previous assignments have provided him the background and experience to undertake all phases of project development from initial planning through operation and maintenance of the completed project. Mr. Kjeldsen currently serves as the District Engineer for the Woodbridge Sanitary District and as District Engineer for numerous Reclamation Districts in the Sacramento-San Joaquin Delta. He has also served as City Engineer for the City of Escalon. Mr. Kjeldsen has served as the Project Manager on numerous public works projects, ranging from sanitary, water supply, and transportation systems to reclamation engineering. Mr. Kjeldsen's extensive experience has included major treatment plant and collection system expansions in several Central Valley communities, including Escalon, San Andreas, Jamestown, Groveland, and Woodbridge.
CHRIS K. KJELDSEN, PH.D. **Kjeldsen and Kjeldsen Biological Consultants**	Dr. Kjeldsen has over thirty years of professional experience in the study of California flora ranging from aquatic plants and fungi to terrestrial plants. He was a member of the Sonoma County Planning Commission and Sonoma County Board of Zoning Adjustments (1972 to 1976). He has over 25 years of experience in managing and conducting environmental projects involving impact assessment and preparation of compliance documents, biological assessments, DFG Habitat Assessments, DFG SB 34 Mitigation projects, COE mitigation projects, and State Parks and Recreation biological resource studies. His experience includes conducting special-status surveys, jurisdictional wetland delineations, general biological surveys, Section 404 and Section 1601 and 1603 permitting, and consulting on various projects. Dr. Kjeldsen has six years of administrative experience at the university level. He spent two years working for the federal government in Washington, DC managing programs for the Department of Energy. Responsibilities: Senior technical lead, botanical fieldwork, and report preparation.

RICHARD NICHOLS **EIP Associates**	Mr. Nichols serves as Director of Natural Resources for EIP's San Francisco office. He has 20 years of experience as a professional biologist and range manager, including seven years of federal agency service. Mr. Nichols holds an M.S. in Range Management from the University of California, Davis and a B.A. in Biological Sciences from California State University, Chico. His responsibilities include preparation of environmental analyses for infrastructure and private development plans and projects. He is especially skilled in biotechnical erosion control, revegetation, and stabilization of disturbed sites on steep slopes. As an example, Mr. Nichols provided state of the art biotechnical erosion control planning for difficult sites on the Petaluma River Habitat Restoration Project, the Priest Reservoir Diversion Channel Stormwater Pollution Prevention Plan Project, the Lake Piombo Mining Reclamation Project, the North Airport Pipeline Restoration Project, and the Tuolomne Meadows Sewer Replacement SWPPP. All of those projects have been successfully implemented using two or more innovative biotechnical methodologies including use of coconut fiber rolls and blankets, brush boxes, contour wattling, live willow staking, brush matting, willow check dams, and native plant plugging and seeding. Mr. Nichols has also recently prepared plans and specifications for similar approaches and will soon be overseeing implementation erosion control installation for the Carter Hill East Pipeline Project, San Pedro Tank Project, and Del Norte Project. He also conducts wetland mitigation and restoration planning and implementation (such as the Lower Crystal Springs Dam Habitat Mitigation Project for the City of San Francisco and the Pilarcitos Creek Fisheries Restoration Plan for the Coastside Water District), mining reclamation, endangered species investigations, wetland delineation and assessment, and mitigation monitoring. Mr. Nichols conducts field inventories, literature reviews, research, and monitoring to assess impacts from development projects and formulates/evaluates feasible and successful mitigation measures. Mr. Nichols is experienced at preparing CEQA/NEPA documents and mitigation/management plans to evaluate and mitigate impacts from water and transportation projects, industrial and residential development, and mining on wetlands, riparian corridors and other sensitive habitats.
JEFFREY A. HART, PH.D. **Habitat Assessment & Restoration Team, Inc.**	Dr. Hart, President of the Habitat Assessment and Restoration Team, Inc. (H.A.R.T) will serve as the restoration contractor. He has had more than 30 years field biology experience on several continents with the last ten years in the Sacramento area. He is a recognized expert in the areas of restoration ecology, resource analysis, and conservation. He has had considerable experience and success in designing and/or implementing many local restoration projects (e.g., Stone Lakes National Wildlife Refuge, Grizzley Slough, Decker Island), bioengineering projects (e.g., Dry Creek, Lower American River), and riparian and wetland resource studies (e.g., Cosumnes River, Lower American River). His clients include mostly government agencies and non-profit organizations such as the Sacramento Area Flood Control Agency, Sacramento County Water Resources Division, Ducks Unlimited, California Department of Water Resources, and The Nature Conservancy. Located in the Delta on Grand Island, H.A.R.T.'s speciality is the restoration of river and Delta wetland and riparian environments. The company includes a nursery, a corporate yard, and an office.
ANDREW T. LEISER, PH.D. **EIP Associates**	Dr. Leiser, Consultant to EIP Associates, is Emeritus Professor of Environmental Horticulture and Emeritus Horticulturist in the Experiment Station of the University of California, Davis, California. He has developed a course on the functional uses of plants and taught courses in taxonomy of ornamental plants. He has a B.S. degree in Agriculture and M.S. in Horticulture from Washington State University and a Ph.D. in Horticulture from U.C.L.A. He was a faculty member (Horticulture) at Purdue University, West Lafayette, Indiana for four years. At Purdue he did research on woody ornamental plants and taught a plant taxonomy course. Three and a half years were spent at the W.R. Grace research laboratories at Clarksville, MD. As a Supervisor of Agricultural Research, his responsibilities were directing research on controlled release fertilizers with an emphasis on revegetation problems on sand dunes, along highways and reforestation as well as horticultural (nursery and landscape applications) uses.

	Dr. Leiser is a renowned expert in biotechnical erosion control. He has been involved with many of the most successful projects and theories in existence today. With Dr. Don Gray, University of Michigan, he has co-authored a book on slope protection and erosion control and revegetation methods. His work at Davis has included research on revegetation of campgrounds, riparian sites (levees), reservoir shorelines and difficult highway sites throughout California and especially in the Sierra Nevada. This research has involved considerable work on the propagation, nutrition and culture of wood plants, including California natives.
GILBERT R. LABRIE, AIA **DCC Engineering**	With over 20 years experience in planning, permitting, engineering and design issues within the Sacramento-San Joaquin Delta and Bay areas, Mr. Labrie has an intimate knowledge of applicable codes and regulatory matters and has been instrumental in the coordination and development of several projects throughout the Bay-Delta area. He is also considered an expert with regards to Delta land use and regulation and has been called upon for input to several regional and State initiated study panels. Mr. Labrie is an active participant of the Delta Protection Commission, the Bay Planning Coalition, the California Central Valley Flood Control Association, the Habitat Advisory Committee.
ROY LEIDY **EIP Associates**	Mr. Leidy is a Senior Scientist specializing in fish and wildlife management. His responsibilities include senior technical review and guidance of natural resource studies and regulatory permitting and compliance. Mr. Leidy holds a B.S. in Forestry and Resource Management from the University of California, Berkeley, and has undertaken advanced studies at the University of Washington, Colorado State University, University of Arkansas and U.C. Davis. Mr. Leidy has broad technical expertise based on his 27 years as a fish and wildlife biologist and regulatory specialist. His technical experience includes fish and wildlife impact assessments using HEP, WHR and IFIM, wetlands delineations and assessments, endangered species surveys and impact evaluations, HCP/HMP planning, river-reservoir ecosystem modeling, water quality modeling and analysis, stream channel stability and watershed assessments, and fish passage and screening design. Mr. Leidy is intimately familiar with CEQA and NEPA compliance procedures and regulations as well as the California Fish and Game Code and Forest Practice Rules. He possesses extensive knowledge of California and Nevada resource management issues and has served as an expert witness on a variety of fish and wildlife topics. Mr. Leidy formerly spent twelve years with the US Forest Service, US Geological Survey and US Fish and Wildlife Service working with many local, state and federal agencies. His work with the US Army Corps of Engineers included such diverse projects as fish screening on the Columbia River, bank protection projects, 404 permitting, flood control projects, aquatic ecosystem modeling, and reservoir fisheries management. Projects with the US Bureau of Reclamation have included fish and wildlife habitat enhancement planning and assessing the impacts of CVP operational changes on reservoir fisheries. Mr. Leidy is a Certified Fisheries Scientist and a Registered Environmental Assessor with the State of California.
JOSEPH D. COUNTRYMAN **Murray, Burns & Kienlen**	Mr. Countryman is principal engineer and president of Murray, Burns & Kienlen. He is a registered professional engineer (civil) and a registered professional hydrologist with 32 years of experience. Mr. Countryman gained much of this experience through his 21 years with the US Army Corps of Engineers prior to joining Murray, Burns & Kienlen in 1988. He has held high-level positions in both planning and design capacities at the Corps, including Chief of the 150-plus employee Civil Design Branch. At the Corps of Engineers, Mr. Countryman supervised many projects that are important to the Delta. Among these were oversight of the Sacramento River Bank Protection Project which constructs erosion protective works from Collinsville to Colusa. In addition, he managed system flood control operation studies for the San Joaquin River, and flood control studies of the Sacramento-San Joaquin Delta. These studies involved the analysis of flood threats, alternative flood control solutions and geomorphology. Mr. Countryman also supervised flood operations for the Corps during the 1983 and 1986 flood events, including reservoir operations and post flood

	design and reconstruction of damaged or destroyed levees. He also provided oversight of the Sacramento and American River flood system analysis in the vicinity of Sacramento, as well as management of design studies and plans and specifications for Sacramento and Stockton Deep Water Ship Channel projects. At Murray, Burns and Kienlen, Mr. Countryman has performed numerous flood control and planning studies for clients. In this capacity, he has performed numerous studies in regard to fluvial processes, including the Mokelumne River within the Delta. He is experienced with various computer models including HEC-1, HEC-2, HEC-6, DWOPER, UNET and MODFLOW. In addition to his technical expertise, Mr. Countryman is also an expert in water resources policy. Mr. Countryman has also reviewed and advised the State Department of Water Resources on the North Delta Flood Plan. For the past several years, Mr. Countryman has served as a consultant to the Sacramento Area Flood Control Agency. In this capacity, he has advised the agency on regional flood control solutions, geomorphology, and policy issues for this large, complex project. As a member of the MBK team, Mr. Countryman would provide engineering, regional flood control and policy consulting expertise to the team.
GEORGE BURWASSER **EIP Associates**	Mr. Burwasser is a geologist with over 25 years experience in geological and soil analysis. He holds a M.S. in Quaternary Geology from the University of Saskatchewan and a B.A. in Geology from Case Western Reserve University. He is responsible for the soil support, slope stability and seismic safety components of EIP's environmental studies. Mr. Burwasser conducts site investigations and literature searches to compile, analyze and evaluate information related to soil and slope stability, landslide potential, soil and rock erosion, land subsidence, flooding susceptibility and earthquake hazard, as well as managing projects where these issues are of concern to EIP's clients. Mr. Burwasser has prepared erosion control and slope restoration sections for EIR's throughout coastal California where hillside stability is of special concern. He has designed bio-technical erosional control plans for water supply pipelines, sewer mains and water tanks, near the cities of Pacifica, Half Moon Bay, and San Francisco, as well as in the highly sensitive Tuolomne Meadows area of Yosemite Park. In San Mateo County, he coordinated EIP's restoration study of the streambed habitat in the upper reaches of Pilarcitos Creek, where two local agencies were involved in restoring the steelhead fishery. In Alameda, Santa Cruz, San Luis Obispo and Ventura Counties, he has worked closely with project engineers to develop rehabilitation plans for quarries being converted to commercial and residential land uses. In the City of Palo Alto, Mr. Burwasser mapped and analyzed the erosional conditions and flooding potential along San Francisquito Creek for the Sand Hill Road realignment and several adjacent Stanford University development projects. For the East Bay Municipal Utility District, he evaluated the liquefaction, floatation and flooding issues associates with the Mokelumne Aqueduct Security Plan. In Sonoma, Contra Costa, and San Mateo counties, Mr. Burwasser analyzed slope and soil stability conditions for several road widening, grade separation, and overcrossing projects adjacent to scenic waterways. His project experience in the Benicia area includes preparing the soils and geology sections for several clean-fuels projects at the nearby refineries; and analysis of slope conditions at Sky Valley, Southampton, and in the Northern Area Sphere of Influence Study Area.

MITCHELL SWANSON **Mitchell Swanson Hydrology and Geomorphology**	Mr. Swanson has over eighteen years of consulting experience in hydrology, hydraulic studies, geologic hazards, and geomorphology related to restoration and resource management in rivers, streams, coastal estuaries, and wetlands. This experience includes the development, management and completion of comprehensive technical and planning studies for a full range of private and public sector clients. Mr. Swanson specializes in the development of technically and environmentally sound management and restoration plans for rivers, estuaries and watersheds. These studies often involve the coordination of many disciplines by Mr. Swanson including biological sciences, hydraulic engineering, land use planning, economics, landscape architecture and environmental planning. In the present era of conflict between environmental regulation and society's need for flood control and utilization of water resources, Mr. Swanson has become a recognized expert in conflict resolution between governmental agencies, and public and private interests. Mr. Swanson has brought international expertise and management techniques used by public water resources agencies in England and Germany to help resolve problems faced by flood control engineers. Mr. Swanson has extensive expert witness experience having appeared before the California State Water Resources Control Board and Board staff, California Superior Court, and the U.S. Congress. Mr. Swanson has testified with regards to hydrology, flood control, reservoir operation, hydraulics, geomorphology, and environmental impacts. Mr. Swanson's technical expertise includes historical geomorphic and hydrologic studies for geologic hazards assessments and in determining the causes and effects of human modification on sediment transport measurement, geomorphic mapping and surveying in rivers, watersheds and estuaries. Mr. Swanson has conducted hydraulic and hydrologic analyses using the HEC-RAS, HEC-6 and HEC-1 computer simulation programs. Mr. Swanson is Principal of Mitchell Swanson Hydrology and Geomorphology, with an office in Santa Cruz.

Table 7. Project Management Team Structure

Demonstration Project for the Protection and Enhancement of Delta In-Channel Islands

Organizational Chart